# Chenguang Huang

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Department of Computer Science & Artificial Intelligence
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## Technical Expertise

- Open-Vocabulary Mapping
- 3D Scene Graphs
- Vision and Language Navigation
- Foundation Models for Manipulation and Navigation

## Education

**Ph.D. in Computer Science** — *Freiburg, Germany*
*University of Freiburg* — *2021 - Now*
Supervisor: Prof. Dr. Wolfram Burgard

**Msc in Robotics, Cognition, Intelligence** — *Munich, Germany*
*Technical University of Munich – Grade: 1.3 (Excellent)* — *2018 - 2021*
Thesis: Visual-LiDAR Instance-Level Mapping
Supervisor: Prof. Dr. Federico Tombari

**Swiss European Mobility Program (Exchange Semesters)** — *Zurich, Switzerland*
*Eidgenössische Technische Hochschule Zürich (ETHZ)* — *2020 - 2021*
Semester Thesis: Pose-Graph-Based Visual-LiDAR Mapping
Supervisor: Prof. Dr. Margarita Chli

**Bsc in Vehicle Engineering** — *Jilin, China*
*Jilin University – Grade: 3.86/4.0 (rank 1st in the major, 1/47)* — *2014 - 2018*
Thesis: Planetary Gear Reducer for Electric Formula Racing Cars
Supervisor: Prof. Dr. Wang, Da

## Work Experience

**Scientific Research Staff** — *Nuremberg, Germany*
*University of Technology Nuremberg, Department of Computer Science & Artificial Intelligence, Artificial Intelligence and Robotics Lab* — *02/2025 - Now*

**Scientific Research Staff** — *Freiburg, Germany*
*University of Freiburg, Department of Computer Science, Autonomous Intelligent Systems Lab* — *10/2021 – 12/2024*

**Student Research Intern** — *Munich, Germany*
*Technical University of Munich, Engineering Risk Analysis Group* — *04/2020 – 09/2020*
- Develop pipelines for 3D object detections from LiDAR and camera on different datasets like KITTI, Waymo and A2D2

**Student Research Intern** — *Munich, Germany*
*Technical University of Munich, Munich Institute of Robotics and Machine Intelligence (MIRMI)* — *04/2020 – 09/2020*
- Develop control interface for applying reinforcement learning algorithms both in simulation and on real robot for Franka Panda

**Student Intern** — *Munich, Germany*
*Siemens Mobility* — *03/2019 – 06/2019*
- Develop automatic pipeline for software testing using GitLab-CI and AWS

## Teaching Experience

**Introduction to Mobile Robotics TA** — *Freiburg, Germany*
*University of Freiburg* — *SS 2022, SS 2023*

**Robot Mapping TA** — *Freiburg, Germany*
*University of Freiburg* — *WS 2022/2023*

**Parallel Programming TA** — *Munich, Germany*
*Technical University of Munich* — *SS 2022*

# Honors & Awards

## AWARDS

2024 **Best Conference Paper Award**, IEEE International Conference on Robotics and Automation — *Yokohama, Japan*
2015 **First Prize for the 8th "Gaojiao Cup" National College Students Advanced Mapping Technology and Product Information Modeling Innovation Competition** — *Yunnan, China*

## SCHOLARSHIPS

2017 **National Scholarship of China**, Ministry of Education of the People's Republic of China — *Jilin, China*
2016 **National Scholarship of China**, Ministry of Education of the People's Republic of China — *Jilin, China*
2015 **National Scholarship of China**, Ministry of Education of the People's Republic of China — *Jilin, China*
2015 **"Liming" Talents Scholarship**, Jilin University — *Jilin, China*

# Publications

## Peer-Reviewed Journal Articles

- BYE: Build Your Encoder with One Sequence of Exploration Data for Long-Term Dynamic Scene Understanding
  **Chenguang Huang**, Shengchao Yan, and Wolfram Burgard
  *IEEE Robotics and Automation Letters (RA-L)*, 2025

- Multimodal Spatial Language Maps for Robot Navigation and Manipulation
  **Chenguang Huang**, Oier Mees, Andy Zeng, and Wolfram Burgard
  *International Journal of Robotics Research (IJRR)*, 2025

## Peer-Reviewed Conference Articles

- Hierarchical Open-Vocabulary 3D Scene Graphs for Language-Grounded Robot Navigation
  Abdelrhman Werby*, **Chenguang Huang***, Martin Büchner*, Abhinav Valada, and Wolfram Burgard
  (*Equal Contribution)
  *Robotics: Science and Systems (RSS), Delft, Netherlands, 2024*

- Open X-Embodiment: Robotic Learning Datasets and RT-X Models
  Open X-Embodiment Collaboration
  *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), Yokohama, Japan, 2024*

- Audio Visual Language Maps for Robot Navigation
  **Chenguang Huang**, Oier Mees, Andy Zeng, and Wolfram Burgard
  *Proceeding of the 18th International Symposium on Experimental Robotics (ISER), Chiang Mai, Thailand, 2023*

- Visual Language Maps for Robot Navigation
  **Chenguang Huang**, Oier Mees, Andy Zeng, and Wolfram Burgard
  *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA), London, UK, 2023*

## Peer-Reviewed Workshop Articles

- BYE: Build Your Encoder with One Sequence of Exploration Data for Long-Term Dynamic Scene Understanding and Navigation
  **Chenguang Huang** and Wolfram Burgard
  *Conference on Robot Learning (CoRL): Workshop on Lifelong Learning for Home Robots, in Munich, Germany 2024*

- Hierarchical Open-Vocabulary 3D Scene Graphs for Language-Grounded Robot Navigation
  Abdelrhman Werby*, **Chenguang Huang***, Martin Büchner*, Abhinav Valada, and Wolfram Burgard
  (*Equal Contribution)
  *IEEE International Conference on Robotics and Automation: Vision-Language Models for Navigation and Manipulation (VLMNM) Workshop in Yokohama, Japan 2024*

- What Matters in Employing Vision Language Models for Tokenizing Actions in Robot Control?
  Nicolai Dorka*, **Chenguang Huang*,** Tim Welschehold, and Wolfram Burgard
  (*Equal Contribution)
  *IEEE International Conference on Robotics and Automation: Vision-Language Models for Navigation and Manipulation (VLMNM) Workshop in Yokohama, Japan 2024*

- Open X-Embodiment: Robotic Learning Datasets and RT-X Models
  Open X-Embodiment Collaboration
  *Thirty-seventh Conference on Neddural Information Processing Systems (NeurIPS) 6th Robot Learning Workshop: Pretraining, Fine-Tuning, and Generalization with Large Scale Models (Robot Learning), New Orleans, the United States, 2023*

- Open X-Embodiment: Robotic Learning Datasets and RT-X Models
  Open X-Embodiment Collaboration
  *Conference on Robot Learning (CoRL) Workshop Towards Generalist Robots: Learning Paradigms for Scalable Skill Acquisition (TGR), Atlanta, the United States, 2023*

- Open X-Embodiment: Robotic Learning Datasets and RT-X Models
  Open X-Embodiment Collaboration
  *Conference on Robot Learning (CoRL) Workshop on Language and Robot Learning (LangRob), Atlanta, the USA, 2023*

- Audio Visual Language Maps for Robot Navigation
  **Chenguang Huang**, Oier Mees, Andy Zeng, and Wolfram Burgard
  *Conference on Computer Vision and Pattern Recognition (CVPR) Embodied AI Workshop, Vancouver, British Columbia, Canada, 2023*

## Software & Datasets

**BYE: Build Your Encoder with One Sequence of Exploration Data for Long-Term Dynamic Scene Understanding and Navigation** *https://byencoder.github.io*

- A pipeline to train your own encoder for long-term dynamic scene understanding and navigation with a single trial of exploration data

**Hierarchical Open-Vocabulary 3D Scene Graphs for Language-Grounded Robot Navigation** *https://hovsg.github.io*

- A hierarchical 3D scene graphs representation for storing instance-level visual-language features for floors, rooms, and objects

**RoboVLM** *https://github.com/Nicolinho/RoboVLM*

- An open-sourced implementation of training Vision Language Action Models for language-conditioned manipulation

**Audio Visual Language Maps for Robot Navigation** *https://avlmaps.github.io*

- A unified 3D spatial map representation for storing cross-modal information from audio, visual, and language cues

**Visual Language Maps for Robot Navigation** *https://vlmaps.github.io*

- A spatial map representation that fuses pretrained visual-language features with a 3D reconstruction of the physical world

## Professional Service

- Reviewer of IEEE Robotic and Automation Letter (RA-L)
- Reviewer of IEEE Transactions on Robotics (T-RO)
- Reviewer of IEEE International Conference on Robotics and Automation (ICRA)
- Reviewer of IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)
- Reviewer of Conference on Robot Learning (CoRL)

## Technical Skills

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|---|---|
| Technology | Proficient in **Python, Linux, ROS, pytorch, C++,** familiar with **tensorflow** |
| Language | **Mandarin and Cantonese** (native language), proficient in **English** (TOEFL 108) and **German** (TestDaF 17) |
| Office | **3D Modeling (AutoCAD/CATIA/Blender), Graph Design (Inkscape), video editing software (ShotCut), static website design, MS Office (PowerPoint, Office, Excel)** |
| Theory | Familiar with **Vision and Language Models, 3D reconstruction, Mobile Robotics, Probabilistic Robotics, Machine Learning, Deep Learning, AI algorithms** |

## Media Coverage

**Visual Language Maps for Robot Navigation** *Google AI Blog, 2023*